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$$x^3 - 4 = 12x - 2$$

$$x^3 - 12x + 14 = (x^2 - 4x + 2)(x + 4) \geq 0 \Rightarrow a \geq -4$$

$$(a-2)^2(a+4) \geq 0$$

$$f(x) = 2 \Rightarrow f(x) = 12x - 2 = 2 \Rightarrow 12x = 4 \Rightarrow x = \frac{1}{3}$$

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الف) $f(1) = 12 \cdot 1 - 2 = 10$ ب) $f(f(x)) = f(12x - 2) = 12(12x - 2) - 2 = 144x - 24 - 2 = 144x - 26$

$$2a = \frac{a^2}{a-1} \quad 2a(a-1) = a^2$$

$$2a^2 - 2a = a^2 \Rightarrow a^2 - 2a = 0$$

$a=0$ ✗ غلط
 $a=2$ ✓ غلط

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الف) $\{(0,0), (1,1), (2,2), (3,3)\}$ ب) $\{(1,1), (2,2), (3,3), (4,4)\}$

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ج) $\{(1,1), (2,2)\}$ د) $\{(1,1), (2,2), (3,3)\}$

$$f \circ g^{-1} = \{(1,1), (2,2), (3,3)\} \Rightarrow \frac{h}{f \circ g^{-1}} = \{(1, \frac{1}{2}), (2, \frac{1}{3}), (3, \frac{1}{4})\}$$

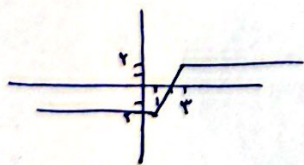
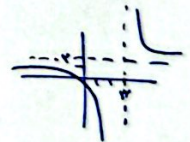
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$$y = \frac{2x+1}{x-2}$$

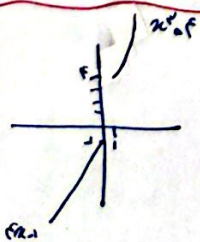
نقطه میانی است

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$$x = \frac{2y+1}{y-2} \rightarrow 2y - 2x = 2y + 1 \Rightarrow y(2-2) = 2x + 1 \Rightarrow y^{-1} = \frac{2x+1}{2-2x}$$



$\Rightarrow [a,b] = [1,3] \xrightarrow{2x-4} y = 2x-4 \rightarrow x = \frac{y+4}{2}$



$\begin{cases} x \geq 1 \rightarrow y = 2x-4 \rightarrow 1 \leq 2x-4 \rightarrow y \geq -2 \rightarrow y^{-1} = \sqrt{2x-4} \\ x \leq 3 \rightarrow y = 2x-4 \rightarrow y \leq 2 \rightarrow y^{-1} = \frac{2x+1}{2} \end{cases}$

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$$\Rightarrow y^{-1} = \begin{cases} \sqrt{2x-4} & x \geq 1 \\ \frac{2x+1}{2} & x \leq 3 \end{cases}$$

$$y = \frac{x^r(x+3) - (x+1)^3}{x+3} = \frac{\cancel{x}^r + 3\cancel{x}^r - \cancel{x}^3 - 1 - 3\cancel{x}^2 - 3\cancel{x}}{x+3} = \frac{-x^3-1}{x+3}$$

$$y = \frac{-x^3-1}{x+3} \xrightarrow{\text{divide}} x = \frac{-y-1}{y+3} = \frac{-x^3-1}{x+3} \rightarrow \frac{-x^3-1}{x+3} \rightarrow a = -9$$

$$b = -2$$

$$u = 9$$

$$f(-x)^{-1} = \frac{9-1}{1} = \frac{8}{1}$$

$$x = \frac{y}{y^2+1}$$

$$xy^2 + x = y$$

$$xy^2 - y - x = 0 \rightarrow y^{-1} = \frac{1 + \sqrt{1-4x^2}}{2x} \rightarrow \frac{2x}{1 + \sqrt{1-4x^2}}, x \in \left[-\frac{1}{2}, \frac{1}{2}\right]$$